

CORRELATION OF MAP UNITS						
Qa	Qc	Holocene		QUATERNARY		
Qn	Qb	Pleistocene				
Ts1		Pliocene-Miocene		TERTIARY		
Tw		Eocene				
P	Po	Lower Permian		PERMIAN AND PENNSYLVANIAN		
Mm1		Upper Mississippian				
ML		Lower Mississippian		MISSISSIPPIAN		
MDu						
SOlf		Upper Ordovician		DEVONIAN		
Osp		Middle Ordovician				
Ogc		Lower Ordovician		ORDOVICIAN		
Esc						
Escw		Upper Cambrian		CAMBRIAN		
En						
Eno1		Middle Cambrian				
Enu		Lower Cambrian				
				PROTEROZOIC	Z	

LIST OF MAP UNITS	
Qa	ALLUVIUM (HOLOCENE)
Qc	COLLUVIUM (HOLOCENE)
Qm	MORAINES (PLEISTOCENE)
Qn	BORNEVILLE DEPOSITS (PLEISTOCENE)
Ts1	SALT LAKE FORMATION (PLIOCENE AND MIOCENE)
Tw	WASATCH FORMATION (EOCENE)
P	OQUIRH FORMATION (LOWER PERMIAN AND PENNSYLVANIAN)
Mm1	MONROE CANYON AND LITTLE FLAT FORMATIONS UNDIVIDED (UPPER AND LOWER MISSISSIPPIAN)
ML	LODGEPOLE LIMESTONE (LOWER MISSISSIPPIAN)
MDu	LEATHAM FORMATION, BEIRNEAU FORMATION, HYRUM DOLOMITE, AND WATER CANYON FORMATION UNDIVIDED (LOWER MISSISSIPPIAN AND DEVONIAN)
SOlf	LAKETOWN AND FISH HAVEN DOLOMITES UNDIVIDED (SILURIAN AND UPPER ORDOVICIAN)
Osp	SWAN PEAK QUARTZITE (MIDDLE ORDOVICIAN)
Ogc	GARDEN CITY FORMATION (MIDDLE AND LOWER ORDOVICIAN)
Esc	ST. CHARLES FORMATION (UPPER CAMBRIAN)
Esc	Worm Creek Quartzite Member
Esc	NOUNAN FORMATION (UPPER AND MIDDLE CAMBRIAN)
Esc	BLOOMINGTON, BLACKSMITH, UTE, AND LANGSTON FORMATIONS UNDIVIDED (MIDDLE CAMBRIAN)
Esc	GEERTSEN CANYON QUARTZITE AND OLDER ROCKS (LOWER CAMBRIAN AND PROTEROZOIC Z)

- AREA OF LOW POTENTIAL FOR BASE METAL AND BARITE DEPOSITS
- APPROXIMATE STUDY AREA BOUNDARY
- CONTACT
- FAULT--Dashed where approximately located; dotted where concealed; bar and ball on downthrown side
- THRUST FAULT--Sawtooth on upper plate
- SYNCLINAL FOLD AXIS--Arrow shows direction of plunge
- MINE SHAFT
- MINE ADIT
- PROSPECT
- PATENTED CLAIM

LIST OF 1:24,000 QUADRANGLES	
IDAHO	UTAH
A MINK CREEK	C MAPLETON
B PARIS PEAK	D EGAN BASIN
E RICHMOND	I MT. ELMER
F NAOMI PEAK	J TEMPLE PEAK
G TONY GROVE CREEK	K LOGAN
H SMITHFIELD	L LOGAN PEAK

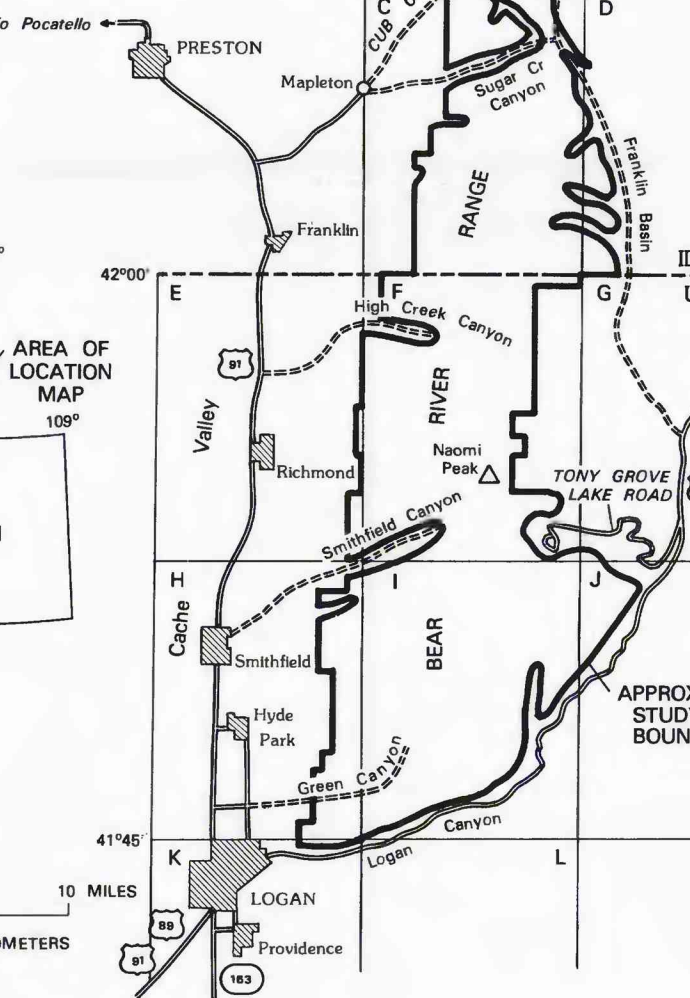


Figure 1.--Index map showing location of the Mount Naomi Roadless Area.

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine the potential for mineral resources. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Mount Naomi Roadless Area (04758) in the Wasatch and Caribou National Forests, Cache County, Utah, and Franklin County, Idaho. Mount Naomi Roadless Area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

#### MINERAL RESOURCE POTENTIAL SUMMARY STATEMENT

A geological, geophysical, and geochemical investigation has been conducted to assess the mineral resource potential of the Mount Naomi Roadless Area (hereafter referred to as "study area"), northeastern Utah and southeastern Idaho. The study area is in the Bear River Range and contains a thick section of Upper Precambrian and Cambrian quartzite and calcareous strata within a major thrust sheet known as the Willard allochthon. Tertiary sediments unconformably overlie the allochthon and both are cut by high-angle normal faults having large displacements. Known mines and prospects are in areas containing sparse lead-zinc and copper minerals. These stratabound mineral occurrences form a distinct north-northeast-trending zone along the outcrop belt of Middle Cambrian limestone beds. This zone has a low potential for base metal and barite deposits as indicated by the discontinuous distribution of mineralized rocks, relatively low concentrations of and disseminated character of metals, and near lack of past production. No significant precious metal, base metal, other trace metal, or uranium anomalies are apparent in the geochemical data from the Mount Naomi Roadless Area. Potential sources of limestone and quartzite for building or agricultural purposes are present within the study area but are less accessible or farther from markets than those currently being quarried nearby.

The study area is 12 mi (19.2 km) west of the nearest oil- or gas-producing wells of the Overthrust Belt. The geology inferred for the study area allows for possible subsurface oil and gas concentrations, but this possibility cannot be evaluated without seismic or drill-hole information. However, potential targets would probably be at depths greater than the 20,000- to 30,000-ft (6,000- to 9,100 m) thickness estimated for the Willard allochthon--depths that may be prohibitive.

A phosphatic zone likely to be present within Mississippian carbonate rocks of the study area is probably too thin to be a resource.

#### INTRODUCTION

The Mount Naomi Roadless Area ("Mount Naomi" is designated as "Naomi Peak" on current U.S. Geological Survey topographic maps) shown in figure 1 extends 28 mi (45 km) along the crest of the Bear River Range, from near Logan, Utah, to a point east of Preston, Idaho (fig. 1). The Bear River Range is within the western part of the eastern Cordilleran fold and thrust belt commonly referred to as the Overthrust Belt. The study area contains a sequence at least 27,500 ft (8,380 m) thick of quartzite, shale, and marine carbonate rocks of Upper Precambrian to Paleozoic age. These sedimentary rocks were moved into their present location along a major system of deeply buried thrust faults, from an original site of deposition far to the west. The main thrust sheet is known as the Willard allochthon, and the pre-Tertiary rocks of the study area occur in a large fold--the Logan Peak syncline--within that allochthon. The basal thrust that floors the Willard allochthon is not exposed within the study area but is inferred from regional geologic relations to be at a depth of 20,000-30,000 ft (6,100-9,100 m). Tertiary sedimentary rocks unconformably overlie the allochthon and both are cut by high-angle normal faults having large displacements that formed after thrusting ceased.

#### GEOLOGY

The Mount Naomi Roadless Area extends 28 mi (45 km) along the crest of the Bear River Range, from near Logan, Utah, to a point east of Preston, Idaho (fig. 1). The Bear River Range is within the western part of the eastern Cordilleran fold and thrust belt commonly referred to as the Overthrust Belt. The study area contains a sequence at least 27,500 ft (8,380 m) thick of quartzite, shale, and marine carbonate rocks of Upper Precambrian to Paleozoic age. These sedimentary rocks were moved into their present location along a major system of deeply buried thrust faults, from an original site of deposition far to the west. The main thrust sheet is known as the Willard allochthon, and the pre-Tertiary rocks of the study area occur in a large fold--the Logan Peak syncline--within that allochthon. The basal thrust that floors the Willard allochthon is not exposed within the study area but is inferred from regional geologic relations to be at a depth of 20,000-30,000 ft (6,100-9,100 m). Tertiary sedimentary rocks unconformably overlie the allochthon and both are cut by high-angle normal faults having large displacements that formed after thrusting ceased.

#### GEOPHYSICS

The study area is characterized by relatively featureless gravity and magnetic contour patterns of low relief. Geophysical data show no local anomalies within the Mount Naomi Roadless Area indicative of buried intrusive rocks or other features that might be associated with metallic mineral deposits. Available geophysical data do not indicate the thickness of sedimentary rocks underlying the study area, but there is no evidence of shallow metamorphic basement, and the data are consistent with a thick layer of sediments underlying one or more thrust sheets.

#### GEOCHEMISTRY

Three hundred and ten samples were collected for geochemical analysis in the Mount Naomi Roadless Area, consisting of 191 stream-sediment samples, 59 representative rock samples, and 60 water samples from springs and surface streams. No significant concentrations of elements or element distribution patterns are evident in the analytical data from the Mount Naomi Roadless Area. Of the 31 elements determined analytically, nine were either not detected in any rock or sediment sample or were detected in concentrations smaller than the limits of quantitative determination, and two other elements are present in measurable amounts in only a few samples. Most of the other 20 elements are present at or below average levels of abundance in sedimentary rocks or in amounts too low to warrant further consideration. Barium, beryllium, copper, lead, and zinc values defined as high or anomalous are only relatively so for the data set considered, and may not represent significantly anomalous concentrations. Most rock samples with relatively high barium (200-1,500 ppm), beryllium (1-5 ppm), copper (20-100 ppm), and zinc (40-120 ppm) values are from Upper Proterozoic and Cambrian siltstone and

shale. These values may reflect concentrations of these elements established soon after deposition of the original sediments. Similarly, stream-sediment samples with relatively high barium (1,000 ppm), beryllium (3 ppm), lead (70-100 ppm), and zinc (110-130 ppm) values, which occur mainly along the west side of the study area just north of the Idaho State line, have no recognized mineralized source and most likely reflect the relatively high background levels of the Upper Proterozoic and Cambrian rocks drained by these streams. Stream sediments with relatively high copper values (70-100 ppm) also occur mainly in the northwest part of the study area underlain by Upper Proterozoic and Cambrian rocks, near mine workings and prospects containing sparse disseminated copper sulfide minerals. The only two detectable precious metal values found are comparatively low silver values (1.0-1.5 ppm) of questionable significance. Scintillometer readings show no significant radioactivity in any sample from the study area. No anomalous trace metal values were found in water samples collected from the study area.

#### MINING DISTRICTS AND MINERALIZED AREAS

The Richmond mining district, named for the town of Richmond, Utah, probably includes all workings within the Utah portion of the Mount Naomi Roadless Area. The district was organized in 1894 and contained 15 mines. Recorded output, which included production from the Hyrum (Paradise) mining district just south of the study area, is limited to small amounts of lead, zinc, copper, silver, and gold shipped from the towns of Hyrum, La Plata, Logan, Paradise, Richmond, and Smithfield (Butler and others, 1920). Production from specific properties inside the study area is not known, except for the patented Fitzgerald Lode east of Richmond (Biggsby, 1982, table 1), which shipped about 190 short tons of lead concentrate, probably in the 1920's or 1930's. The Egan mine on the South Fork of City Creek has over 140 ft (42.7 m) of workings, but no known production. Samples from the Egan mine contain small amounts of lead and zinc.

Inside the roadless area are three patented mining claims--Fitzgerald Lode (one claim) and Mine Hill (two claims)--and about 350 unpatented claims. The descriptions of most unpatented claims are vague in the location notices. Prospecting probably began in the late 1860's and early 1870's after minerals were discovered west of Salt Lake City. The earliest known claims were filed in the mid-1880's.

Mines and prospects were found in eight sites (Biggsby, 1982, table 1) in the study area: along the south and north forks of City Creek, in Smithfield Canyon, in Dry Canyon, along the North Fork of High Creek, north of Logan Canyon, and north and south of Maple Creek (see map). Samples taken at the workings include chip samples or cross sections of suspected zones of altered or mineralized rock, and grab samples from dumps. All samples were fire-assayed for gold and silver and analyzed spectrographically for 40 elements. Of the eight sites, three were barren and five contain lead-zinc or copper minerals disseminated parallel to bedding in Middle Cambrian limestone country rock. Three sites containing lead-zinc minerals are on the south (Egan mine) and north (Fitzgerald Lode) forks of City Creek and in Smithfield Canyon, and two containing copper are south (Hill mine) and north (Gayman mine) of Maple Creek. These five workings and one of the barren prospects are within a north to northeast-trending belt of Middle Cambrian limestone exposures extending the length of the study area. Many of the workings show no evidence of faults or other deformational features, and where small faults or breccia zones are present, they do not appear to have confined or concentrated mineralization. Base metals are sparse and scattered at all workings examined. Although base metals, where present, are usually associated with barite, not all barite occurrences contain base metals; the total quantity of barite is probably also small, because the barite is present as scattered and discontinuous veins.

#### ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Old workings at five places in the study area contain disseminated lead-zinc and (or) copper minerals associated with barite in limestone country rocks. These, along with one barren prospect are distributed along a north-northeast-trending zone coinciding with a belt of Middle Cambrian limestone and shale that crops out along the west limb of the Logan Peak syncline, on the west side of the study area. This belt of stratabound mineral occurrences is judged to have low potential for base metal and barite deposits on the basis of (1) the discontinuous and disseminated distribution of the minerals, (2) the relatively low concentrations of metals, and (3) the near lack of past production.

No significant precious metal, base metal, other trace element, or uranium anomalies are apparent in the geochemical data from the Mount Naomi Roadless Area.

Potentially quarriable limestone and quartzite occur within the study area, but more accessible sources closer to markets are currently being utilized to the limit of present demand.

Thin phosphatic interbeds in Mississippian strata probably occur at high altitude within the study area, but are likely to be too thin and widely spaced to be considered a potential resource.

Oil and gas concentrations could be present beneath the Willard allochthon at depths exceeding 20,000-30,000 ft (6,100-9,100 m), but the oil and gas potential of the study area cannot be evaluated without seismic or drill-hole information.

No other leaseable mineral deposits are known to be in or near the Mount Naomi Study Area.

#### REFERENCES CITED

Biggsby, P. R., 1982, Mineral investigation of the Mount Naomi RARE II Further Planning Area, Cache County, Utah, and Franklin County, Idaho: U.S. Bureau of Mines Open-File Report MIA 126-82.  
Butler, B. S., Loughlin, G. F., Heikes, V. C., and others, 1920, The ore deposits of Utah: U.S. Geological Survey Professional Paper 111, 672 p.  
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## MINERAL RESOURCE POTENTIAL MAP OF THE MOUNT NAOMI ROADLESS AREA, CACHE COUNTY, UTAH, AND FRANKLIN COUNTY, IDAHO

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